



Description of land uses implemented in StormTac, v. 2018-05-09

Blue text = new land uses and/or updated description.

This guide presents a description of each land use that is featured in StormTac Web. The standard values regarding both stormwater and baseflow, as well as runoff, are specific for each land use in StormTac Web. The Standard concentrations and runoff are based on flow proportional sampling and flow measurements downstream the watershed. For each land use, it is possible to apply own data for both pollutants and runoff coefficients, e.g. if measurements or specialized knowledge exists for the specific area.

The land uses are selected from a list in the box “(Sub)watershed area”. One and a same land use, e.g. Residential area or Road 1, can only be used once and the properties these are given (e.g. runoff coefficients and concentrations) are valid for all (sub)watershed areas. However, if you would like to create e.g. more residential areas (up to 10 more) with different such properties, then one of the land uses Own 1, 2, 3, ..., 10 can be selected and one can choose to copy all properties from “Residential area” and later change these properties. Then “Own 1” could e.g. be named “Residential area 2, less dense”.

Land use	Alt. notation	Description
Agricultural property	Agriculture land, farmland	Agricultural land with different types of (not specified) crops, such as arable land that can be plowed and pasture.
Airport		Place where aircraft take off and land, incl. buildings and surrounding mostly paved land, but also a smaller proportion of green areas.
Allotment area		Allotments or allotments with cultivation and possibly with small houses.
Artificial turf field		Field with artificial grass excl. soil (instead of normal grass planted in soil).
Block without road		Block (ceilings and courtyard), excluding the surrounding traffic areas (e.g. local streets, walkways and cycle paths).
Block without road with local disposal of stormwater		Block (ceilings and courtyard), excluding the surrounding traffic areas (e.g. local streets, walkways and cycle paths), with local disposal of stormwater
Cemetery	Graveyard	Surface with tombs, paths, green spaces, buildings and parking.
Concrete slab		A plate (a flat surface) of concrete, without a specified use.
Downtown area		Area of dense downtown buildings, retail, car parks (not necessarily counted separately) and the like.
Downtown area, less polluted		Downtown area (see separate description) which is less dense and not as hard as done normally, can alternatively be specified by using the land use Downtown area and reduce the factor to less than 5 in the box Runoff flow below Concentration in the model Pollutant transport.
Downtown area, more polluted		Downtown area (see separate description), more impervious than normal, can alternatively be specified using the Downtown area and increase the factor to

Land use	Alt. notation	Description
		more than 5 in the box Runoff flow below Concentration in the model Pollutant transport.
Farm	Ranch, livestock keeping, animal keeping	An area intended for disposal (care, feeding and accommodation) of animals, incl. building for animals, green spaces, access road and parking
Farm by agricultural land		The land area at a farmland, incl. building, access road and parking and the adjacent green and gravel surfaces, or the like.
Firing range		A field firing range, incl. green areas and walkways.
Forest	Woodland	Forest with different types of trees, including smaller roads and mountains.
Forest clearings	Cutting area, clear-cutting, clearing	Surface with felled forests, clear-cutting.
Gas station	Petrol station, service station	Facility area with gas station, car wash, parking and the like.
Golf course		A golf club throughout the area for practicing golf.
Grass area		Only grass area without walkway etc.
Gravel		Gravel surface without a specified use.
Gravel with trees		Gravel surface planted with trees but without a specified use.
Green roof		Roof area covered with vegetation, e.g. sedum plants.
Harbor zone	Dockside, portside, port area, dock area	Harbor with buildings and traffic areas
Highway road ditch		Highway ditch receiving e.g. spray from cars and road runoff flowing down the slopes of the ditch. Therefore the stormwater in the ditches gets higher pollutant concentration than a green area that only receives pollution from atmospheric deposition.
Hospital		Area with hospitals, parking, local street, etc.
Industrial area		Area of industrial activity of various kinds, including buildings and traffic areas.
Industrial area, less polluted		Industrial area (see separate description) which is less dense and not as impervious as normally, can alternatively be specified by using Industrial area and reducing the factor to less than 5 in the box Runoff flow below Concentration in the model Pollutant transport.
Industrial area, more polluted		Industrial area (see separate description) which is more impervious than normal, can alternatively be specified using the Industrial area and increase the factor to more than 5 in the box Runoff flow below Concentration in the model Pollutant transport.
Junkyard	Scrapyard, old car dump, car dismantling area, car breaker's yard	Surfaces for car dismantling in which the motor vehicle is drained from hazardous fluids and then disassembled, include building and trafficked areas.
Larger parking area		A large parking space with much vehicle traffic (high traffic intensity), e.g. a trade or center parking
Loading dock		An exterior area of a building where goods vehicles are loaded and unloaded, commonly found on commercial and industrial buildings.
Local street after reduction in open ditch		The road surface for local roads in a residential area, where the streets have not curbstones and all road runoff is led into the open ditch in which pollution

Land use	Alt. notation	Description
		reduction is assumed. No customized ditch for a more effective reduction is provided for, but a normal grass coated roadside ditch with a relatively steep slope gradient
Local street with curbstones		The road surface for local roads in a residential area, where the streets have curbs and all road runoff is led down through wells into the storm drains.
Marina		Marina for smaller boats including parking lots and green surfaces.
Meadow		Meadow, open field or open grassland with vegetation, type grasses and herbs, etc.
Metal recycling center		Recycling farm or recycling center for the collection and recycling of scrap metal in containers, incl. trafficked areas.
Mixed green area		A green area with a mixed vegetation of both trees (small woodlots), grassland or parkland.
Mixed multi-family area and down town, suburb		A mixture of multi-family and downtown area (see description of each of these) in the suburbs, outside central parts of a city.
Mixed multi-family area and down town, town		A mixture of multi-family and downtown area (see description of each of these) in the city center, i.e. in densely and largely impervious central area.
Mixed residential area		A mix of detached buildings (villas, terraced houses, semi-detached houses and town houses).
Mountain area		Natural ground with rocks. Rock surfaces in woodland etc.
Multi-family area		Area of multifamily buildings, including all land use within a normal apartment block area, such as local streets, ditches, roofs, driveways, small parkings and lawns.
Multifamily area with biofilter with local disposal in block		Apartment block area (see description of this land use) in which the stormwater from e.g. walkways and cycle paths and / or streets is led into the plants with submerged plant beds (biofilters) where it is cleaned and flow compensated, and where local management takes place within the blocks (roofs and courtyards).
Multifamily area with biofilter without local disposal in block		Apartment block area (see description of this land use) in which the stormwater from e.g. walkways and cycle paths and / or streets is led into the plants with submerged plant beds (biofilters) where it is cleansed and flow compensated, but where no local disposal occurs within the blocks (roofs and courtyards).
Multifamily area with street trees in a skeletal soil (macadam-soil mixture) with Local disposal of stormwater in the block.		Apartment block area (see description of this land use) in which the stormwater from e.g. walkways and cycle paths and / or streets is led into the plants with skeletal soil with trees where it is cleansed, and where local management takes place within the blocks (roofs and courtyards).

Land use	Alt. notation	Description
Multi-family area with street trees in a skeletal soil (macadam-soil mixture) without Local disposal of stormwater in the block.		Multi-family block area (see description of this land use) in which the stormwater from e.g. walkways and cycle paths and / or streets is led into the plants with skeletal soil with trees where it is cleansed, but where no local disposal occurs within the blocks (roofs and courtyards).
Multi-family area with total local disposal of storm water		Apartment block area (see description of this land use) within which all surface water be disposed of (purified and flow compensated) locally. Virtually all roof stormwater is led through downspouts discharge chute to a green space through which it largely can infiltrate and where all stormwater from driveways and local streets are headed over green space or into the ditches where part can infiltrate, where sedimentation can take place and where stormwater can be filtered through plants.
Multi-family area with total local disposal of storm water, excl. Roads		Apartment block area (see description of this land use) within which all stormwater be disposed of (purified and flow compensated) locally, except the road runoff which is led down through the gullies in the stormwater sewers out of the area without purification and flow detention.
Office area		Area with office buildings, parking and other traffic areas and minor share of green space.
Office area with street trees and skeletal soil (macadam-soil mixture) and blocks without local disposal		Office area (see description of this land use) in which the stormwater from e.g. walkways and cycle paths and / or streets led into the plants with skeletal soil with trees where it is cleansed, but where no local disposal occurs within the blocks (roofs and courtyards).
Own area 1-10		<p>Up to 10 own land uses can be specified for e.g. the following cases:</p> <p>a) Another area already included in a sub watershed area as land use type, e.g. a residential area with a different runoff coefficient or a road type further than Road 1-10.</p> <p>b) Created surface representing an upstream part of the area with a treatment and/or flow detention facility, where the calculated outlet concentration is stated as both the stormwater and the base flow concentration. Total upstream area and runoff coefficients are also given for the surface. See guide Facilities in series.</p> <p>c) An area for which sufficiently well measured concentrations are available (see Guide Method Description). These data are input for the stormwater and baseflow concentrations for this area.</p> <p>d) An additional constant point flow (an additional point load) can be simulated as Own area, which is added only in the Base flow box. It can for example be an industrial process water (such as condensate water) from a thermal power plant which is led into a wet pond along with stormwater from the area. A (fictional) area is designated as Own area in the Box Base flow by testing different areas until the point flow increases the</p>

Land use	Alt. notation	Description
		<p>base flow as much as the size of the point flow should be. As an example, the fictive area of 275 ha as input for Own 1 results in a calculated base flow of 10 l/s if $K_x = 0.7$. (Default). Then the point flow concentrations are specified in the Base Flow (concentration) box.</p> <p>e) Vertical material surfaces of e.g. copper (copper walls) or zinc (rails, lamp posts). Enter volume coefficient = 1, area = 0 in the baseflow box, remove the surface in the Design flow box (not to double counting). Enter only the value of the substance (found in the database) in the stormwater box, the other substances are input as 0. The values in the database ($\mu\text{g/l}$) have been calculated from emission data ($\text{mg/m}^2/\text{year}$), for which it is included that not the whole surface is exposed to direct precipitation and that the release velocity is less from a vertical surface. Therefore, the standard concentrations are lower than from e.g. roof surfaces (copper and zinc roofs are to be input as roofs, see that land use). The total material area is to be entered in the model since the standard concentrations have been reduced considering this.</p>
Park grounds		Park areas, including footpaths.
Parking		Separate parking space outside buildings, or that need to be counted separately due to planned measures for this area. Factors 0-10 in the box Runoff flow below Concentration in the model Pollutant transport can be used to specify a smaller or busier parking, where the default 5 gives the median value (standard concentration) in the database.
Pavers		Pavers with joints (coarse sand, gravel or the like) between the stones that allow some infiltration of stormwater through the joints.
Pedestrian and cycle path		Paved area intended for pedestrians and cyclists.
Railway embankment		Landscaped embankment of the railway, subway lines or tram. Superstructure of gravel, self-draining understructure.
Railway embankment in concrete, light train		Data from light train (high velocity train) with concrete embankment instead of the traditional gravel embankment.
Recreational area	Sports ground, athletic field, sports field, athletic ground	Sports field with grass or gravel surface incl. associated buildings and parking lots.
Recycling center		A recycling center (RC), sometimes called a recycle park, is a facility for the collection of bulky waste, such as furniture, wood waste, yard waste, scrap metal and hazardous waste (such as paint, electronic waste and construction waste). Including containers, roadways, parking areas and buildings.
Residential and terraced area		A mixture of residential and terraced area (see description of each of these), where the surfaces of the respective type of area is not specified.

Land use	Alt. notation	Description
Residential area		Area with houses, including all land use within a normal residential area, for example, local streets, ditches, roofs, driveways and lawns.
Residential area with total local disposal of storm water		Residential area (see description of this land use) within which all stormwater can be disposed of (purified and flow compensated) locally. Virtually all roof stormwater is led through downspouts discharge chute to a green space through which it largely can infiltrate and where all stormwater from driveways and local streets are headed over green space or into the ditches where part can infiltrate, where sedimentation can take place and where stormwater can be filtered through plants.
Residential area with total local disposal of storm water, excl. Roads		Residential area (see description of this land use) within which all stormwater be disposed of (purified and flow compensated) locally, except the road runoff which is led down through the gullies in the stormwater sewers out of the area without purification and flow detention.
Residential area without road ditches, max		Residential area (see the description of the land) in which the road runoff from local streets are not led down to the ditch but led directly into the wells and further into stormwater, calculated maximum value from such an area.
Residential area without road ditches, min		Residential area (see the description of the land) in which the road runoff from local streets are not led down to the ditch but led directly into the wells and further into stormwater, calculated minimum value from such an area.
Residential area without road ditches, standard		Residential area (see the description of the land) in which the road runoff from local streets are not led down to the ditch but led directly into the wells and further into stormwater, calculated standard value from such an area.
Residential area, excluding road		Residential area (see description of this land use) excluding the surface of roads (roads counted separately).
Residential area, less polluted		Residential area (see description of this land) with larger plots than normal and with local streets with less traffic than normal, and with road ditches that receive stormwater, which together provide lower levels of pollution than from a "normal" (average in the database) residential area.
Retirement home center	Area of nursing home, area of old people's home, area of geriatric care	Residential area with retirement home incl. local roads, parking, green areas, etc.
Road 1-10	Throughfare, highway	Trafficked road surface with yearly average day traffic (ADT, annual daily traffic), specified in the box Runoff flow under Concentration in the model Pollutant transport. Default ADT for road 1, 2, 3 ...10 = 0, 1000, 2000, 5000, 10 000, 15 000, 25 000, 50 000, 100 000 and 150 000, but the ADT of each road can be changed. Selected type of road 1-10 applies to all use areas A1, A2 , ..., A99.

Land use	Alt. notation	Description
		If you would like to use more than 10 types of roads, the land use Own 1-10 can be used, then copy Own 1, 2, ...10 from Road 1, 2, ..10 respectively and in that way 10 extra road types can be used.
Roof		Roof area without specification of roofing materials, is used if you want to calculate the roof's load (flows and/or pollution) separately from one or more residential areas without an inventory of different roofing materials. Instead, use the data in specific ceiling coating of certain material on pollution estimates from the specific ceilings to be calculated, if you know what the material is, e.g. the copper value for copper roofs. The other substances are recommended to be left unchanged.
School campus		Area of school building, schoolyard, any sports ground and parking as well as smaller proportion of green areas.
Square		A square without specification of the type of use of the square.
Stone flower bed		Paved area with flower beds with vegetation.
Stone quarry	Rock excavation, rock shaft	Surface with excavated mountain, where stones, rock or gravel is excavated from the ground, incl. open land area, entry and exit roads and piles / slopes with the excavated material.
Storing yard including asphalt spilling etc.		Surface of deposits with different materials such as asphalt spills, including heavily trafficked areas within the facility.
Surface water	Atmospheric deposition	Open water of the type ponds, lakes, streams and oceans which get a load of atmospheric deposition direct on the surface water body. It is possible to set up a designed facility area as Surface water, if the direct load of atmospheric deposition is to be accounted for. The latter will also add an increased design flow from the precipitation, affecting both the calculated design flow and the required flow detention volume in the box Flow detention. The precipitation on the facility area and its effects on the required flow detention is however accounted for in the biofilter box, which is one of the explanations of different required volumes compared to those from the box Flow detention, if the facility area is not included in the box (Sub)watershed area.
Swimming pool area		Area with swimming pool, building and parking etc.
Tank farm	Fuel stock, fuel deposit	Oil deposit, a facility for storage of petroleum products, incl. trafficked areas.
Terraced area with total local disposal of storm water		Virtually all roof stormwater is led through downspouts discharge chute to a green space through which it largely can infiltrate and where all stormwater from driveways and local streets are headed over green space or into the ditches where part can infiltrate,

Land use	Alt. notation	Description
		where sedimentation can take place and where stormwater can be filtered through plants.
Terraced area with total local disposal of storm water, excl. Roads		Townhouse Area (see description of this land use) within which all stormwater be disposed of (purified and flow compensated) locally, except the road runoff which is led down through the gullies in the stormwater sewers out of the area without purification and flow detention.
Terraced house area		Area with terraced buildings, including all land use within a normal terraced area, such as local streets, ditches, roofs, driveways, small parkings and lawns.
Thermal power station with storage areas and traffic surfaces		Surface with thermal power plant, ancillary buildings, traffic areas and storage areas for fuel, etc.
Vacation cottage development	Cottage area, holiday house area, secondary residence, weekend cottage area	Vacation area with individual wastewater sewage systems, including local streets, homes and land.
Vacation cottage development, permanent living		Vacation area with permanent living with individual wastewater sewage systems, including local streets, homes and land. Increased traffic and increased share of impermeable surfaces due to permanent living.
Waste dump site		Surface for management (recycling / incineration) of waste from e.g. households and industries, incl. buildings, storage areas and traffic areas.
Wetland		Marsh. Vegetation covered water areas, such as marshes, beaches and bogs.
Woodland and meadow		A mixture of woodland and meadow (see respective description).
Yard area within block		Grass-, asphalt- and gravel surfaces within a block (assumed 1/3 of the surface each).